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HIBERNATION PECULIARITIES OF *PLATYSAMIA GLOVERI* STR. (SATURNIIDAE, LEPIDOPTERA)

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Recent observations of *Platysamia gloveri* Str. have brought out some interesting facts on the varying length of hibernation periods. The *gloveri* moth is restricted almost entirely to the Rocky Mountain Region of the western United States. This implies in general, therefore, the ability to withstand subzero weather throughout the lengthy winter season.

The larvae of the *gloveri* moth feed very heavily and at the time of spinning have considerable fat stored up for the long dormant period to follow. The average length of time in the cocoon is nine and one-half months, although it may vary according to the weather in April and May.

During the 1937-1938 season, ninety-six *gloveri* cocoons were kept for emergence in the spring. The moths started coming out in early May and continued until early June. At this time the cocoons were examined and nine were found from which the adults had not emerged. These were kept in ordinary outdoor temperatures all through the summer but did not emerge. On the first of March of the following year (1939), these cocoons were brought in from freezing temperatures and retained in a warm room. The day following, one moth emerged and others followed every day or two until eight had emerged. Left in outside temperatures the moths would probably have emerged three or four weeks earlier than the insects which spun in the summer of 1938.*

These moths had hibernated for a period of nineteen months, or more than a year and a half. During both winter periods zero temperatures had occurred and during the summer the temperature approached 100°F. several times. Upon emerging, the moths appeared normal. They were perfect specimens and were not lacking in vitality. Furthermore they lived as long as they would have done if they had emerged the previous year. The females, however, showed a definite decrease in the number of eggs produced, there being only about two-thirds the normal number. Cocoons of *Platysamia rubra* Behr. from California were also kept through the summer and emerged a year late with identical results.

This two year brood appears to be a normal occurrence with *gloveri* as it has been observed during several other seasons. Such a condition is probably very beneficial in the preservation of the species in certain areas where grass fires, boring insects or periods of drought destroy the willow thickets where the larvae must feed. In other instances parasites may be so numerous as to kill off all the larvae and newly formed pupae during a season. The small carry-over from the cocoons spun two season before may then tend to bridge the gap which would occur because of some catastrophic event and the species would thereby be perpetuated.

P. gloveri cocoons spun in late June have been kept under normal conditions and have emerged during early August of the same year. The eggs laid by this shortened generation hatch and attain complete growth by the last of September. Although it is not certain, it seems probable that this generation may

*Cocoons spun in 1938 were also kept in the same warm room and emerged two to three weeks later than the two year old cocoons.

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supply the cocoons which do not emerge until two seasons later. If this be true there are actually two generations each year. The normal generation spins in late July and emerges the following May. The other group spins in September, lies dormant during the following winter and summer and the second winter and emerges in early April of the next season, the adults producing the short summer generation thus alternating between a very long and a very short generation to supplement the normal life history.

Such a bridging-over arrangement would be very useful in thus protecting the species from extinction under occasionally very unfavorable circumstances.

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NEW NORTH AMERICAN GEOMETRIDAE WITH NOTES, III*

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Melanolophia imitata v. **barbara** var. nov.

Typical *imitata* from Vancouver Island and the southern interior of British Columbia is brownish in coloration with at times a slight purplish tinge. There is before me a specimen from Santa Barbara Co., Calif., in which the entire upper surface is definitely tinged with olive-green; this, in combination with a very indistinct type of maculation, gives it a decided mossy appearance. Genitalically it does not differ from the topotypical form. As it probably represents a race from the southern regions of California I give it the above name.

Holotype— ♂, El Cielo Drive, Santa Barbara Co., Calif., June 30, 1938, (C. W. Kirkwood); No. 4960 in the Canadian National Collection, Ottawa.

Galenara errantaria n. sp.

Male antennae strongly bipectinate. Palpi short, scarcely attaining front, deep smoky. Head and thorax deep smoky. Primaries with the basal area blackish, defined outwardly by a black t. a. line, gently outwardly rounded from costa to below cell, then with a decided incurve in the fold; this line has a faint narrow inner border of whitish. Median space whitish-gray, slightly sprinkled with black and crossed by a broad oblique blackish band which occupies the entire outer half of this area with the exception of a pale patch between the black discal streak and the t. p. line. T. p. line upright, finely dentate with a gentle incurve below cell, bordered narrowly outwardly by whitish, followed by a dark shade. Subterminal and terminal areas pale, rather heavily sprinkled with blackish. Pale s. t. line defined in costal area of wing by broad blackish shading on inner side and diffuse shading outwardly, almost discontinued in central portion of the wing and again visible, but with considerably narrower dark shading, above inner margin. A broken black terminal line. Fringes dusky. Secondaries pale smoky with dark discal streak and curved postmedian and subterminal lines, the latter rather broad and slightly irregular. A dark terminal line and concolorous fringes. Beneath pale smoky white with the maculation of the upper side more or less repeated. Expanse 30 mm.

Holotype— ♂, Alpine, Ariz., June 17, 1936, (G. and J. Sperry); No. 4957 in the Canadian National Collection, Ottawa.

The species fits the generic description of *Galenara* with the exception that the abdominal organ of the eighth segment is wanting. Vein 9 on hindwings is present and vein 11 of primaries free; there is no fovea at base of forewing

*Contribution from the Division of Entomology (Systematic Entomology), Department of Agriculture, Ottawa.

and the hind tibia possesses a hair pencil. The genitalia, of which a figure is given (fig. 1) are quite distinct and seem to combine characters of both *Gaienara* and *Melanolophia.*

Stenoporpia vernalella n. sp.

Very close to *vernata* B. & McD., but the ground-color of wings more even purplish-gray without the black and white contrasts of *vernata.* Brown shading much more extended than in *vernata,* occurring in the basal area, broadly along inner margin and subterminally below costa, in the bend of t. p. line opposite cell and at inner angle of wing. Maculation of primaries almost identical with that of *vernata,* the t. a. line slightly less bent below costa and at inner margin and the t. p. line with the incurves opposite cell and in fold somewhat stronger. The terminal dark line is less prominent and both wings appear to be less scalloped. On the secondaries the smoky shade beyond postmedian line is rather more diffuse and the pale s. t. line hardly as strong. Expanse, ♂ 30 mm., ♀ 33 mm.

Holotype—♂, Cave Cr., Chiricahua Mts., Ariz., May 24, 1934, (G. and J. Sperry); No. 4958 in the Canadian National Collection, Ottawa.

Allotype—♀, same data.

Paratype—1 ♂, same data (in Coll. J. Sperry).

The male genitalia (fig. 4) are quite similar to those of *vernata;* the claspers are longer and narrower and the chitinized costal portion is more gradually drawn out to a point, terminated by two short spines, one below the other (in paratype on one side only a single spine). The juxta is much longer in the narrow apical portion than in *vernata.*

Stenoporpia gracilella n. sp.

Thorax and wings even light purplish-gray, faintly sprinkled with smoky. Primaries rather narrow and attenuated. T. a. line narrow, black, outcurved from costa to cubital vein, then strongly inwardly oblique to inner margin at about one-fourth; preceded by a broad smoky shade. Median area of even width throughout and with even grayish coloration; faint indications of a dark median line through centre of this area; discal ringlet obsolescent. T. p. line black, narrow, rounded gently outward below costa to vein 6 and with indications of minute teeth on the veins, then parallel to t. a. line. In the male and one female the line shows slight incurves on cubitus and above vein 1, in the *allotype* it is without these and almost straight; a faint smoky shade beyond t. p. line, separated from it by a fine line of the ground-color. S. t. line indistinct, pale, scalloped. Terminal area rather more suffused with smoky than subterminal area, especially shortly below apex. Dark terminal line faintly indicated, outer margin not scalloped. Fringes light gray. Secondaries similar in coloration to primaries, crossed by black ante- and postmedian oblique lines, obsolete on costa, converging at inner margin. Beyond the postmedian line and separated from it by a fine pale line is a band of light smoky brown, followed by a paler area of equal width; the balance of the terminal area is light smoky with indications of a pale somewhat irregular s. t. line near its inner margin. Wings, especially in female, lightly scalloped. Beneath even pale silky gray. Expanse 38 mm.

Holotype—♂, Huachuca Mts., Ariz., June 2, 1935, (G. and J. Sperry); No. 4959 in the Canadian National Collection, Ottawa.

Allotype—♀, Barfoot Park, Chiricahua Mts., Ariz., May 24, 1934, (G. and J. Sperry).

Paratype—1 ♀, Cave Cr., Chiricahua Mts., Ariz., May 24, 1934, (in Coll. J. Sperry).

The male genitalia (fig. 5) agree in the broadness of the uncus with *purpuraria* B. & McD. and *separataria* Grt. The chitinized costal portion of

the clasper shows a slight shoulder on its costal edge beyond one-half and is armed terminally with a long spine, flanked on each side by a very small one.

A study of male genitalia reveals that two species have been included under the name *Anacamptodes defectaria* Gn. (*albigenaria* Wlk.); these two species are so similar in maculation that it is only by a study of the genital organs that a correct separation is possible. In the one case the two prongs of the *uncus* (fig. 3) are long, close together and slightly serrate apically, in the other (fig. 2) (as figured in my "Cleorini Studies") they are short, stubby and wide apart; there are other differences in the shape of the terminal portion of the sacculus and in the armature of the aedeagus but the first mentioned character is most useful as it can generally be observed by removing a few hairs from the end of the abdomen.

Under these circumstances the correct identification of Guenée's name becomes of considerable importance; unfortunately, according to Oberthur, the type has been lost and the type locality, given simply as "North America", is not very helpful. However in the British Museum, as I have already pointed out (1914, Contr. II (5) 211), *albigenaria* Wlk. was placed as a synonym and this name was based on specimens from E. Florida. Correspondence with Mr. H. W. Capps of the U. S. National Museum elicits the fact that all the Florida material in their collections under the name *defectaria*, including the specimens bred by me at Lakeland and on which the larval description was based, belongs to the species with long uncus prongs; the collection also contains similar specimens from N. Carolina (S. Pines) and Texas (Kerrville, Brownsville). In our own collection is material from Texas (Brownsville), Oklahoma (Idabel, Grant, Oswalt) and Arkansas (Hope). In view of the widespread distribution of the species and the probability that Guenée's material came from the southern Atlantic States (possibly Georgia) I believe the synonymy should stand as listed but the application of the name be changed from that given in my Cleorini revision.

The second species with short uncus which, apart from a single specimen from Kerrville, Texas, in the U. S. N. M., is only known from Brownsville, Texas, was figured in my revision (Pl. VIII, fig. 9) as *defectaria* and the genitalia of the same specimen figured on Plate V, fig. 12. It will now need a name and I describe it as follows:

Anacamptodes perfectaria n. sp.

Anacamptodes defectaria McD. (*nec* Guenee) 1920, Bull. 18, Can. Dept. Agr. 30 (*partim.* Pl. V, fig. 12; Pl. VIII, fig 9).

Male. Maculation of wings practically similar to that of *defectaria* Gn., the only point of distinction so far found being the fine dark terminal line on both primaries and secondaries in addition to the terminal dots; only the latter are present in *defectaria*. The inward bend of the t. p. line above inner margin is very strong and is noticeably deeper than in our Brownsville specimens of *defectaria*, although other specimens in our series do not bear out this distinction very satisfactorily. On the underside neither the terminal dark shades nor the marginal black spots seem as well developed as in *defectaria*. Expanse 28-30 mm.

Female. Larger than the male with the maculation not so pronounced; the wings are somewhat more finely speckled with blackish. Otherwise similar. Expanse 30-35 mm.

Holotype—♂, Brownsville, Tex., Dec. 12-15, No. 4980 in the Canadian National Collection, Ottawa.

Allotype—♀, same locality, 3-11 (G. Dorner); in the United States National Museum.

Paratypes—3 ♂, Brownsville, Tex., Jan. 20, Mar. 26, 1937, (T. N. Free-

man); in the Canadian National Collection, Ottawa; 13 ♂, same locality, Apr. 22, 25, 29, May 13, 14, Nov. 5, 6, 7, 10, 1928, (F. H. Benjamin); 1 ♂, same locality (no further data); 5 ♀, same locality, May 24, June 12, 1928, (F. H. Benjamin); May 17, June 12, 1904, (H. S. Barber); no date (R. A. Vickery); all in the United States National Museum.

The specimen figured under *defectaria* in my revision has been made the holotype of *perfectaria;* this figure is slightly smaller than natural size. Figures of the male genitalia of both species are also given. (figs. 2 and 3).

Yermoia Gen. nov.

Palpi short, not exceeding front, rough-scaled. Proboscis well developed. Antennae of male very finely and shortly ciliate. Front bulging, squarely cut off in front, covered with appressed dark scales. Patagia with rough scales and long hair, (thorax denuded). First abdominal segment covered dorsally with appressed golden scaling. Wings ample, outer margin well rounded; primaries with 12 veins, 6 from upper angle of cell, a large, broad areole, extending well beyond cell, formed by the junction of 7-10, 7 from its apex, 8 and 9 long stalked, also from apex of areole, 10 from near base of 8, short-stalked, 11 from middle of cell, running extremely close to upper edge of areole and diverging to costa near apex of same; no fovea in male. Secondaries with 5 weakly developed, not tubular, 6 and 7 connate, 8 close to cell for half its length. Legs long, thin, hind tibia without thickening or hair-pencil. The male genitalia (fig. 6) are of a rather simple type, the claspers being evenly broad and unarmed, the uncus thin, long and pointed, the gnathos well-developed and with a bunch of apical spines, the aedeagus thin, tapering posteriorly, the juxta broad at base, with lateral edges slightly upturned and rear margin gently excavate, narrowing apically to two short blunt points.

Genotype. Yermoia perplexata n. sp.

The position of this genus is rather problematic; judging simply by the genitalia it would fall near *Gabriola* Tayl. which, however, in other details shows little resemblance.

Yermoia perplexata n. sp.

Primaries rather frail, deep smoky, slightly paler in the median section, veins faintly outlined in light ochreous. No definite maculation. T. a. and t. p. lines indicated by short black streaks on the veins; as thus indicated the course of the t. p. line is parallel to outer margin about two-thirds out. A thin dark discal streak. Faint indication of s. t. line by some slight whitish sprinkling below costa. A series of terminal, black, interspaceal streaks. Fringes concolorous cut by a paler line. Secondaries frail, dull whitish, shaded outwardly with smoky. A series of terminal dark dots and a very faint discal dot. Beneath dull whitish with slight sprinkling of smoky; discal and terminal black dots prominent on both wings. Pale smoky fringes, checkered outwardly with deeper smoky. Expanse 30 mm.

Holotype— ♂, Yermo, S. Bernardino Co., Calif., Jan. 28, 1938; No. 4962 in the Canadian National Collection, Ottawa.

Euchlaena vinulentaria v. **ochrearia** var. nov.

The western race of this species is considerably paler in coloration than eastern specimens, the purple or chocolate-brown being replaced by ochre-brown and the basal two-thirds of the primaries being usually quite pale ochreous, variably sprinkled with bright brown. This paling of the coloration in the West seems to be the normal tendency among *Euchlaena* species and, as in other cases racial names have been proposed, it seems well to follow this procedure and designate this race as above indicated.

Holotype— ♂, Waterton Lakes, Alta., June 20, 1923, (J. McDunnough); No. 4963 in the Canadian National Collection, Ottawa.

Allotype—♀, same locality, July 2, 1922, (C. H. Young).

Paratypes—3 ♂, same locality, July 13, 1923, (J. McDunnough); 2 ♂, same locality, June 21, 1922, July 1, 1923, (C. H. Young).

Specimens are also before me from Aweme, Man.; South Mt. Lake, Sask.; Lethbridge and Banff, Alta., all very pale, and from Kaslo, Penticton and Seton Lake, B. C.

Genus **Nepytia** Hlst.

Hulst's definition of this genus is faulty as regards the venation; in all species examined, including the genotype, *semiclusaria* Wlk., there is a double areole on primaries, just as in *Meris;* I fail also to find a definitely developed fovea. The genitalia show a very close alliance with *Somatolophia* but the double areole can be used as a means of separation. Most of the species lack the hind-tibial hair-pencil in the males, as in *Meris,* but in *regulata* B. & McD. and the following new species it is present; at the moment I would not care to consider this character as having generic value, in view of the similarity of genitalia with other *Nepytia* species.

Nepytia disputata n. sp.

Antennae in male strongly bipectinate, in female faintly serrate, each lateral projection terminating in two fine hairs. Hind tibiae in male with well developed hair-pencil. Palpi short, porrect, deep smoky. Front slightly bulging, deep smoky gray. Thorax and abdomen deep smoky gray. Primaries with outer margin strongly convex with possibly the slightest indication of an angle at vein 4; color deep smoky brown with the outer half of the median area, broadest at costa and narrowing toward inner margin, still deeper smoky. T. a. line indistinct, smoky, rather broad, outcurved below costa and accentuated by pale dots on subcostal and cubital veins. Discal streak faint, narrow, blackish, T. p. line fairly well-marked and accentuated by the contrast between the dark color of the outer median area and the paler subterminal area; outcurved and concave from costa to above vein 6, then weakly crenulate and rather rigidly oblique to inner margin before tornus, blackish, accentuated by pale dots on the veins, in the hollows of the weak crenulations. S. t. line indicated by several more or less conjoined smoky blotches below costa, continued by a faint smoky line, running close to t. p. line. Fringes concolorous. Secondaries slightly paler than primaries with rather large, black, discal dot and faint, dark, curved, postmedian line, continuing t. p. line of primaries and like this, dotted with pale on the veins; beyond it a slight paling of the ground color, with s. t. line indicated by small obscure smoky blotches opposite cell and above anal angle. Outer margin feebly crenulate, fringes concolorous. Beneath much paler, especially secondaries, being light ochreous sprinkled heavily with smoky atoms; outer lines of upper side repeated and marked on veins by black dots; beyond these the veins are outlined in pale ochreous; dark discal dots, small on primaries, large on secondaries. Expanse, ♂, 32-35 mm., ♀, 38 mm.

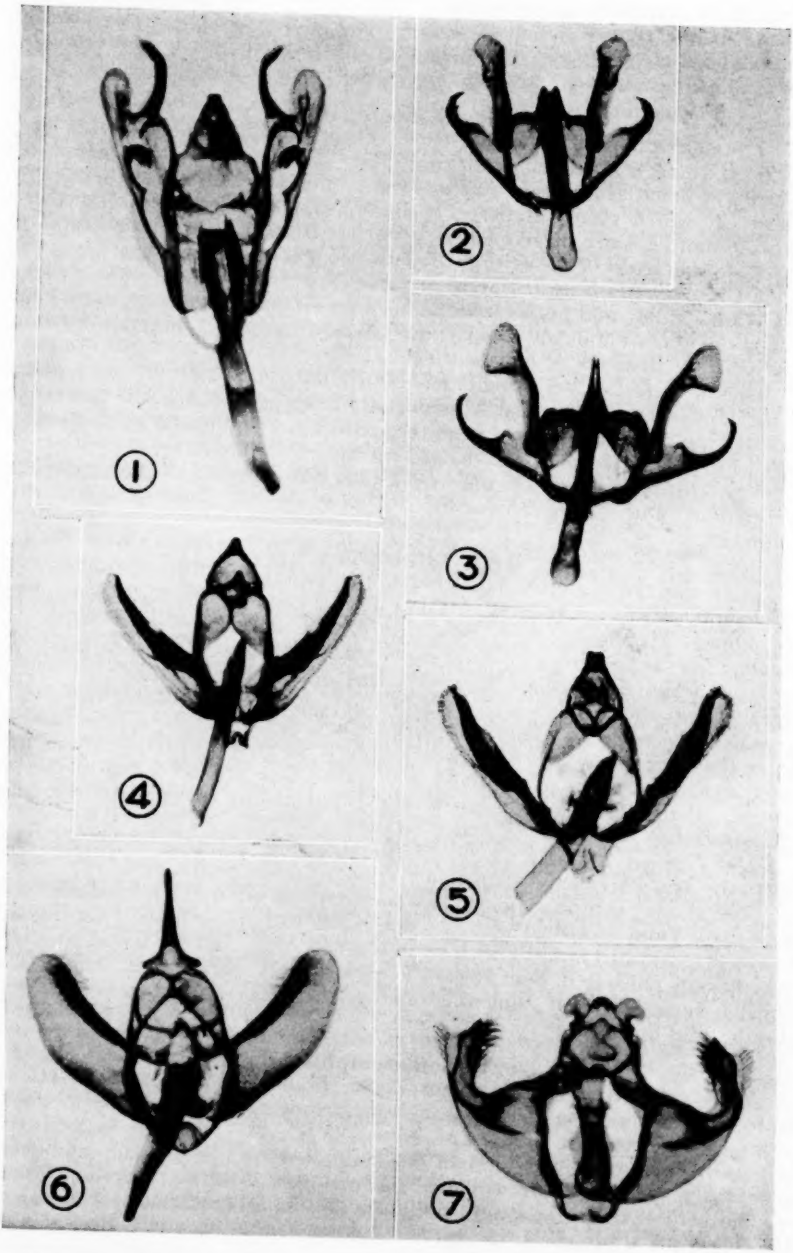
Holotype—♂, Greer, Ariz., June 12, 1936, (G. and J. Sperry); No. 4493 in the Canadian National Collection, Ottawa.

Allotype—♀, Chiricahua Mts., Ariz., Sept. 22, 1927, (J. A. Kusche).

Paratypes—1 ♂, same data as holotype; 2 ♂, White Mts., Ariz., June 26, 27, 1935, (G. and J. Sperry).

The male genitalia are very similar to those of *regulata* B. and McD. both differing from those of typical Nepytias in the fact that the gnathos is not broadly rounded, the apex being narrow, upturned and furnished with a triangular bunch of spines. In the present species the furca-arm is almost median, slightly curved and attaining almost to apex of gnathos; it is furnished apically with a bunch of very fine, slightly projecting spines. The aedeagus is short and stubby, drawn out on one side apically with the vesica furnished with a large bunch of fine cornuti.

PLATE VII



Male genitalia of *1. Galenara errantaria* n. sp.; *2. Anacamptodes perfectaria* n. sp; *3. Anacamptodes defectaria* Gn.; *4. Stenoporpia vernalella* n. sp., *5. Stenoporpia graciella* n. sp.; *6. Yermoia perplexata* n. sp.; *7. Meris suffusaria* n. sp.

It is probably this species which was misidentified by Grossbeck as *haydenata* Pack. as he mentions the hair-pencil (1907, Ent. News, XVIII, 147); later in this paper the reasons are given for non-acceptance of Grossbeck's determination. The species has also probably been distributed by me as *Meris alticola* Hlst., following a wrong determination in the Barnes Collection.

Genus **Meris** Hlst.

The description of this genus (1896, Trans. Am. Ent. Soc. XXIII, 248) was based on a female specimen of *alticola* Hlst. The venation of a portion of the forewing is noted as follows: "10 and 11 anastomosing with each other and with 9 and 12" which clearly indicates a *double areole,* a feature which, together with the shorter, more porrect palpi, at once separates *Meris* from *Somatolophia.* The male characters of the genus, based on two specimens from Las Vegas, N. M. in the United States National Museum, are given by Grossbeck (1908, Proc. Ent. Soc. Wash., X, 88) and his sex association is presumed to be correct as he had the female type before him for comparison. According to this description the male hind tibia is "destitute of hair-pencil".

One of these Las Vegas males has been kindly loaned me by the authorities of the United States National Museum and I might add that the genitalia are very striking and quite distinct from those of species of *Nepytia* or *Somatolophia* with which *Meris* seems best associated on superficial characters.

Very closely allied to *alticola* in genitalia but differing in the much shorter pectinations of the male antennae is a new species from southern British Columbia.

Meris suffusaria n. sp.

Male antennae shortly bipectinate, the pectinations somewhat claviform. Palpi short. Proboscis reduced. Wings deep smoky, slightly mottled with paler sprinkling. Maculation very indistinct; dark t. a. line indicated as a gently rounded line, arising from a diffuse costal patch; another patch above small discal streak indicates the median line; t. p. line arising from a third costal patch, slightly bent outward below costa and then parallel to outer margin, weakly crenulate. Secondaries somewhat paler than primaries, especially in basal half where they incline to be semihyaline and lack the pale sprinkling found in the outer area; indications of a curved postmedian line, most distinct above inner margin. Beneath, in color much as above but almost immaculate, secondaries with small dark discal dot. Expanse 36 mm.

Holotype—♂, Shingle Cr. Road, Keremeos, B. C., July 15, 1936, (A. N. Gartrell); No. 4964 in the Canadian National Collection, Ottawa.

The chunky genitalia (fig. 7) are extremely aberrant. The uncus is broadly hood-shaped and furnished with two dorsal leaf-like appendages; a short gnathos is present, furnished apically with weak spinules; the clasper is broad basally, the costa heavily chitinized, bent inward at right angles apically and forming a pad which is furnished with numerous bristles; the aedeagus is asymmetrically and bluntly bifid apically.

Genus **Somatolophia** Hlst.

Hulst's description of the genus (1896, Trans. Am. Ent. Soc., XXIII, 350) caused at one time considerable confusion among taxonomists, due to the fact, as shown by Grossbeck (1907, Ent. News, XVIII, 147) that the male specimen of *umbripennis,* the genotype, had been supplied with the female abdomen of some other species; in consequence the abdominal tufting mentioned in the original generic characterization should be deleted. Furthermore, I cannot find that any fovea is present at the base of the male forewing and believe this character should also be omitted. The balance of the characterization is correct and a single areole is very definitely indicated by the words "10 on 11, scarcely anastomosing with 9, 11 from cell."

Somatolophia haydenata Pack.

The identity of *umbripennis* Hlst. with *haydenata* Pack. was once the subject of considerable argument among workers. Dyar (1904, Proc. Ent. Soc. Wash., VI, 225) made the two names synonymous; Grossbeck (*op. cit.*) contended that *haydenata* possessed a hair-pencil on the male hind tibia, not present in *umbripennis,* and that the two were distinct species, an argument accepted later by Dyar (1907, Ent. News, XVIII, 205). There was, however, evidently a confusion of some other species with *haydenata* by Grossbeck; this latter species, described as a *Gnophos.* was based (1876, Mon. Geom., 445, Pl. XI, fig. 27) on two females from Colorado (one from Clear Cr. Canyon, near Denver) and a figure of the venation given (Pl. V, fig. 5) shows the single areole on primaries; after a study of Packard's types the B. & McD. Check List of 1917 placed *umbripennis* as synonymous with *haydenata.* In a series of four practically topotypical males and one female before me from Strontia Spgs., Colo., a locality just south of Denver, the latter specimen agrees excellently with Packard's figure, especially as regards the course of the crenulate t. p. line; the whole series shows the "uniformly pale reddish-ash-gray" given by Packard as the color of *haydenata* and I am convinced that these specimens represent Packard's species; *none of the males possesses any trace of tibial hair-pencil.*

In the male genitalia the claspers are broad, rounded apically, unarmed; the *gnathos* is broadly rounded and furnished apically with sparse spines; the *furca arm,* a characteristic feature, is rather long, *curved to the right,* and nearly attains to base of costa; a spiculate band runs along its left side and is furnished apically with a cluster of small spines which scarcely project beyond the edge of arm; the *vesica* shows an armature of 4 or 5 weak spines in a cluster (at times these seem to be lacking).

As to whether *umbripennis* Hlst. is a synonym of *haydenata* is difficult to decide at the present moment; the type locality given is simply "Colorado", a point in favor of the two names being synonymous; on the other hand the original description states that all wings are 'dark fuscous' which, in view of the fact that at least one other, hitherto unrecognized, closely allied species with dark fuscous wings, but with different genitalia occurs in the south-west (Arizona), adds an element of doubt to the situation. A very careful comparison of material with Hulst's male type (which, unfortunately lacks abdomen) will be necessary to decide the point. There is before me a small series of this dark Arizona species captured in the Baboquivari Mts. in July as well as a single male from Palmerlee, Cochize Co. The main distinction in the genitalia from ***haydenata*** is found in the *furca arm* which is *not curved,* but straight; it is shorter, broader, roughly conical and inclined either slightly to the right or placed nearly centrally; it has a central spiculate band, the apical portion of which is furnished on underside with the usual cluster of short, appressed spines; temporarily I am applying the name *umbripennis* to this series. I have further several specimens of what may be a spring form of the preceding but which certainly is distinct enough to warrant a name, especially as the male shows some slight genitalic differences; I describe it as follows:

Somatolophia pallescens n. sp.

Palpi, head and thorax light ochreous shaded with smoky. Wings pale creamy, lightly sprinkled with smoky and shaded faintly with light brown in the basal area of primaries and on the inner side of the t. p. line on both wings; heavier blue-gray shading along inner edge of t. a. line on primaries and in the subterminal area beyond the t. p. line on both wings, where it forms more or less defined blotches.

Primaries with outer margin rather more bulging than in *haydenata;* lines

distinct, smoky-brown; t. a. line bent outward below costa, irregularly and rather strongly dentate on the veins; a small black discal spot with a smoky patch above it on costa, median area otherwise strikingly pale; t. p. line strongly crenulate, in general parallel to outer margin. The outer edge of the blue-gray subterminal shading is irregularly dentate, especially below costa and is narrowed considerably above veins 2 and 4 by incisions of the pale ground color of the terminal area. Fringes concolorous, cut with smoky. Secondaries similar to primaries in color and maculation but antemedian line barely indicated by some slight smoky shading. Beneath whitish, faintly tinged with ochreous outwardly and with slight dark sprinkling in this region; maculation of upper side shows through partially. Expanse, ♂, 33 mm.; ♀, 38 mm.

Holotype—♂, Greer Road, White Mts., Ariz., June 27, 1935, (J. A. Comstock); No. 4975 in the Canadian National Collection, Ottawa.

Allotype—♀, Oracle, Ariz., June 5, 1935, (G. and J. Sperry).

Paratype—1 ♀, Peppersauce Canyon, Santa Catarina (? Catalina) Mts., Ariz., June 4, 1935, (J. A. Comstock).

In the male genitalia the *furca arm* is distinctly longer than in so-called *umbripennis*, attaining to base of transtilla on right side; its central spiculate band shows a narrow, spined area in upper two-thirds, increasing in density and width toward apex. The *vesica* shows a patch of numerous small cornuti, lengthening and spreading out towards apex of patch.

Genus **Apicia** Gn.

There is a remarkable similarity between the genitalia of the North American species included in this genus (which, incidentally, will probably have to be replaced by *Eusarca* Hbn.) and those under *Somatolophia* Hlst.; the venation is also similar and the only radical differences appear to be in the stronger angulation of the outer margin of the wings and the presence of a hind-tibial hair-pencil in the males of *Apicia;* even these distinctions are not constant as several species lack the hair-pencil and in some the angulation is not very marked. In any case the two genera should fall next each other and not be so widely separated as was done in the Check List.

Apicia falcata Pack.

The name *falcata* Pack. was based on a single female with no further data than "California (Edwards)"; it was evidently a more immaculate specimen than usual, the only markings mentioned being "three subapical black spots" on a "pale ochreous" ground color. The original figure, however, (1874, Proc. Bost. Soc. Nat. Hist., XVI, Pl. I, fig. 32) shows traces of the usual oblique t. p. line. A female before me from the San Bernardino Mts., Calif. (June) agrees well with the diagnosis, except that the t. p. line on both wings is moderately distinct; a further pair from Los Angeles obviously belongs here but the specimens are deeper in color, the male being deep fawn and the female yellowish ochre with brown shadings in the median area; there are traces of an irregular t. a. line, strongly bent outward below costa and the distinct t. p. line is narrowly bordered outwardly with whitish. In the male genitalia the broad claspers are weakly chitinized, unarmed, rounded apically; the *gnathos* is broad, rounded and furnished with a few (6-7) apical spines, the *furca* is fused to a single straight arm, extending on right side, slightly oblique, to near base of transtilla and furnished in apical third with a bunch of closely appressed spines, adhering to a spiculate band on the under surface and projecting slightly beyond apex. the *vesica* is armed with two weak cornuti, situated alongside each other and surrounded by a few weak spicules.

Apicia terraria n. sp.

Very similar to *falcata* in wing shape and course of cross-lines. Color of wings a light clay-color, quite heavily sprinkled with blackish; on primaries the

definite subapical spots of *falcata* are not present, but there is a tendency for the black sprinkles to fuse immediately beyond the t. p. line into several, small indeterminate clusters, below apex, opposite cell and above inner margin. T. a. line scarcely defined, more or less lost in the black sprinkling; t. p. line rigidly oblique, moderately distinct, deep fawn, bordered outwardly narrowly with pale; a large black discal dot. Secondaries with t. p. line of primaries continued across wing, gently curved; discal dot fainter than on primaries. Beneath same color as above with heavy black sprinkling and no maculation but the discal dots. Expanse, ♂, 38 mm.; ♀, 40 mm.

Holotype—♂, Dunsmuir, Calif., July 4, 1934, (G. and J. Sperry); No. 4972 in the Canadian National Collection, Ottawa.

Allotype—♀, same data, July 6.

Paratypes—2 ♂, Shasta Springs, Calif., July 8, 1939, (G. and J. Sperry); 1 ♀, Dunsmuir, Calif., July 4, 1934, (G. and J. Sperry); 1 ♀, Lassen Nat. Park, Calif., July 20, 1937, (J. A. Comstock).

The male genitalia differ from those of *falcata* in the following particulars: The *gnathos* is more heavily spined apically; the *furca* arm is broader, shorter, and almost median in position; its central spiculate band broader with the apical spined area commencing at one-half and the spines themselves being fewer and stronger. The *vesica* armature consists of a variable cluster of thin cornuti (there may be as many as 20) placed obliquely one above the other.

Paratypes will be placed in the Sperry Collection and in the Collection of the Los Angeles Museum. The two males from Shasta Springs are somewhat darker in color (light fawn-brown) than the holotype.

Apicia galbanaria Hlst.

The species varies in coloration from a light olive-yellow (typical) to a pale fawn-gray, judging by a series before me taken by G. and J. Sperry in the Baboquivari Mts., Ariz. in April; in these the male shows a small but distinct hind-tibial hair-pencil. In other specimens, taken in the same region by O. C. Poling in September, this hair-pencil seems to be lacking or very much reduced; these specimens are smaller but show no genitalic differences from the spring specimens.

My determination is based on similarity of genitalia between our specimens and those in the United States National Museum, comparison being kindly made by J. F. Gates Clarke; characteristic is the long, narrow *furca* arm which extends to the base of the uncus and is armed apically with a closely appressed cluster of spines; the vesica is armed with a cluster of 6-8 thin cornuti.

Apicia subflavaria Pears.

This species, described from Brownsville, Tex., has been listed as a synonym of *fundaria* Gn. There are, however, sufficient distinctions in the male genitalia to warrant the supposition that it is a distinct species; the *furca* arm is considerably shorter and the patch of cornuti in the *vesica* consists of fewer, but longer and stouter, spines. In a series from the type locality before me the deep olive color of the male wings is quite striking and constant; my single male of *fundaria* from Florida is deep fawn-brown and the female shows a broad brown border to the yellow hindwings not present in my three females of *subflavaria*. The males show a ventral tuft of fine bristles at the base of the second abdominal segment which is not found, as far as I have been able to check, in our more definitely North American species, and which allies the species more closely to the South and Central American forms.

Apicia distycharia Gn.

This name, or its synonym *cayennaria* Gn., has been appearing in our North American lists ever since Packard's Monograph where, under the name

Caberodes cayennaria Gn. he lists and figures (1876, Mon., 533, Pl. XI, fig. 53) what he had determined as this species from Texas (Dallas). After studying Oberthur's excellent figures of Guenée's types of *distycharia* and *alteraria*, which he considered slight individual varieties of *cayennaria* (Et. Lep. Comp. VI, 249, 252, Pl. 149), I was doubtful of the identity of our Texan species. Correspondence with Mr. L. B. Prout of London, England, secured South American specimens of the true species as well as confirmation of the synonymy suggested by Oberthur. Through the courtesy of Dr. N. Banks four males of the Texan species were sent from the Museum of Comparative Zoology, Cambridge, for examination; this series included three males from Dallas, Texas (Boll) and one male without locality label but with Packard's handwritten label "*Caberodes cayennaria* Gn.", originally from the Peabody Academy collection and probably from Waco, Texas. One of the Dallas males bore Zeller's green label "*Apicia cayennaria* Gn.". A comparison of genitalia showed that the Texan males were totally distinct from true *cayennaria* and that this name should, therefore, be dropped from our lists.

The Texan species, being apparently unnamed, is described as follows:

Apicia packardaria n. sp.

Caberodes cayennaria Packard (*nec* Guenee), 1876, Mon. Geom., 533, Pl. XI, fig. 53.

Male. Palpi short oblique, ochreous, shaded outwardly with pale fawn. Head and thorax light fawn. Antennae light ochreous, strongly bipectinate. Hind tibia slightly swollen, with hair-pencil. Primaries subfalcate, pale yellow-ochreous with the basal two-thirds shaded, especially toward inner margin, with fawn and with the whole terminal area beyond the t. p. line deep fawn. T. a. line brown, strongly outwardly oblique from costa to cubitus, above base of vein 2, then turning sharply at right-angles and inwardly oblique to inner margin at one-third. A brown oblique dash on costa at one-half, above the small dark discal dot. T. p. line brown, in general parallel to t. a. line; arising from an oblique brown costal dash, outwardly oblique to below apex of wing, then angled at right-angles; bordered outwardly by a narrow pale ochreous line, beyond which is diffuse smoky shading, broadening above anal angle. Between the upper section of the t. p. line and the apex of wing a brown triangular patch, with faint ochreous shade bordering it outwardly. Secondaries fawn-brown with t. p. line of primaries continued across wing as a gently curved, brown line, bordered outwardly with pale. Inner half of wing with a faint yellowish tinge and a very small, discal dot, outer half paler in the subterminal area which is defined outwardly by indistinct smoky shading, less distinct than on primaries. Beneath, pale yellowish in basal two-thirds of primaries and inner half of secondaries, marbled faintly with brown, lines as above but fainter. The terminal third of primaries is heavily shaded with purplish-gray, much heavier in the subterminal area where it forms a distinct band; a similar but rather paler band occurs on the secondaries. Small discal dots on all wings.

Female. Similar in maculation to the male but rather smaller in size and paler in color, with less of the fawn-brown suffusion on upper side. Forewings more falcate. Expanse, ♂, 30-33 mm.; ♀, 26-28 mm.

Holotype—♂, Dallas, Texas (Boll) in the Museum of Comparative Zoology, Cambridge, Mass.

Allotype—♀, Broken Bow, Okla., July 29, 1937, (Standish-Kaiser); No. 4985 in the Canadian National Collection, Ottawa.

Paratypes—2 ♂, same data as holotype; 1 ♂, no data (? Waco, Tex.); 1 ♀, Pearson, Okla., July 23, 1937, (Standish-Kaiser). One male and the female in the Canadian National Collection, the others in the Museum of Comparative Zoology.

There is considerable variation in the amount of fawn suffusion on the wings, the description being based on a particularly well-marked and shaded specimen; some of the male paratypes are almost as pale as the females.

The male genitalia, unlike those of *cayennaria,* are not particularly *Apicia*-like. In the clasper the costal margin is thickened and ends apically in a short, sharp point, projecting at right-angles to the costal edge; the uncus is rather short and stout; the gnathos is broad and furnished with a strong cluster of apical spines; there is *no furca-arm* but the anellus forms a high, chitinous collar, hollowed out in front to a broad groove. The aedeagus is slightly expanded apically and furnished in this area with numerous spines, which form a circlet around its apex. The strong cluster of spines, found in *cayennaria* and its allies on the medio-ventral section of the second abdominal sternite is reduced to a row of much finer spines, almost hairs.

Apicia venosaria n. sp.

Male. Primaries subfalcate, varying in color from deep fawn-brown (holotype) to pale fawn or smoky fawn, very lightly sprinkled with fine black speckles (more decidedly so in the smokier colored specimens). Veins finely outlined in pale ochreous (less distinctly in the smoky specimens). Cross-lines much as in *falcata* Pack.; t. a. line brown, edged narrowly inwardly with pale ochreous, outwardly oblique from costa to near base of vein 2, then bluntly angled and almost perpendicular to inner margin at one-third; t. p. line rigidly oblique, brown, edged outwardly with pale ochreous, sharply but indistinctly angled to costa just below apex of wing; traces of small smoky subapical spots, usually confined to a small spot in the interspace between veins 5 and 6; a small dark, discal dot; fringes concolorous. Secondaries weakly angled at vein 3, similar in color to primaries with t. p. line of primaries continued across wing, very weakly curved; a small dark discal dot. Beneath light ochreous, shading into brownish outwardly and lightly sprinkled with black; the dark discal dots of upper side are present as are also traces of the t. p. line.

Female. Wings, as usual, more angulate than in male sex. Venation not so well outlined. Color much paler than in male, being a light ochre with faint brownish shading, outside of t. a. and inside of t. p. lines. Beneath still paler. Expanse, 30-35 mm.

Holotype—♂, Huachuca Mts., Ariz., May 26, 1935, (G. and J. Sperry); No. 4973 in the Canadian National Collection, Ottawa.

Allotype—♀, same data, May 30, 1935.

Paratypes—7 ♂, 1 ♀, same data, May 27-30; 2 ♂, Huachuca Mts., Ariz., May 30, June 1, (J. A. Comstock).

A well developed hind-tibial hair-pencil is present. In the male genitalia the *uncus* is long and narrow, the *gnathos* weakly spined apically, the *furca* arm reaching on right side slightly beyond base of costal edge of clasper, furnished on inner side from base to apex with a row of closely appressed fine spines, placed obliquely and in length about half the width of the arm. The *vesica* is armed with a fan-shaped or obliquely arranged group of 30-40 fine cornuti.

I had identified the species as probably *argillaria* Hlst., but Mr. Gates Clarke, who kindly made a slide of the genitalia of the male type of this species in the United States National Museum informs me that the genitalia do not agree.

Apicia geniculata Hlst.

I have been unable to locate the type of this species; it is neither in the Rutgers College Collection, New Brunswick, N. J., nor in the United States National Museum at Washington. In consequence, I am basing my determination of the species on material so named in the latter institution from Utah. According to this the species agrees with *confusaria* in lacking the hind-tibial

hair-pencil in the male. It is a smaller and paler species than the preceding one, the oblique portion of the t. a. line below costa shorter and the angle more obtuse; the remainder of the line is upright and almost perpendicular to inner margin; the t. p. line angulation below apex is well-defined, with somewhat longer angle. In the male genitalia the *uncus* is relatively short, the *gnathos* broad apically and well-spined, the *furca* arm very short, centrally placed and blunty conical; the *vesica* is armed with two strong spines, arising apparently from a single broadened base; these are followed apically by a group of 10-12 smaller spines placed obliquely and diminishing in size towards apex of aedeagus.

The species is superficially close to *confusaria* but the course of t. a. line is different and the size is considerably smaller. Six males from Utah (Provo, Beaver) are before me as well as a male from White Mts., Ariz., much darker in color but with similar genitalia.

Apicia tibiaria n. sp.

Very similar to the preceding species and generally confused with it. Differs, among other things, in the presence of a distinct hind-tibial hair-pencil in the male. The color of the wings is a more even deep fawn-brown, the inner portion of the t. a. line, beyond the rather sharp angle is somewhat inwardly oblique and parallel to the t. p. line. T. p. line as in *geniculata*, strongly bordered outwardly on both wings with pale ochreous. Small discal dot on both wings. Beneath, light ochreous, heavily sprinkled with brown and with indistinct, broad, terminal, purplish-brown shading on both wings. Expanse 28 mm.

Holotype—♂, Baboquivari Mts., Ariz., Aug. 15-30, 1921, (O. C. Poling); No. 4974 in the Canadian National Collection, Ottawa.

Paratypes—3 ♂, same data.

The male genitalia are of the same type as those of *geniculata* but the aedeagus is much larger, the two strong basal spines of the vesica more than twice as long, occupying the apical two-thirds of the aedeagus, the cluster of smaller apical spines reduced to six in number.

In Fascicule IX (1) of his Etudes de Lepidopterologie Comparee Oberthur presents figures of the types of certain Geometridae described by Guenee from Paris Museum material; from a study of these figures one is forced, in the interest of priority, to accept two of Guenées names in place of well-known names of other authors.

Tetracis cachexiata Gn.

Tetracis cachexiata Gn., 1857, Sp. Gen. Lep. IX, 142.

Tetracis lorata Grt., 1864, Proc. Ent. Soc. Phil. III, 91; McDunnough, 1938, Check List, No. 5198 (*new synonymy*).

Guenée's species was erroneously described as from New Holland, but the figure (Pl. 233, fig. 1900) matches exactly the species which heretofore has been going under the name *lorata* Grt. Oberthur mentions (*op. cit.* p. 22) that this was also the opinion of M. Thierry-Mieg.

Antepione thisoaria Gn.

Heterolocha thisoaria Gn., 1857, Sp. Gen. Lep. IX, 106.

Hyperythra arcasaria Wlk., 1860, Cat. Lep. Brit. Mus. XX, 131; McDunnough, 1938, Check List, No. 5200 (*new synonymy*).

Thisoaria was described from a female from unknown locality and Oberthur was inclined to associate it with the Costa Rican *rhombadaria* Oberth. The figure, however, (Pl. 233, fig. 1898) agrees so exactly with females before me under the name *arcasaria* Wlk. as to leave no doubt in my mind that Guenée's name must be given priority.

Prochaerodes forficaria Gn.

The receipt of a topotypical pair of *P. nubilata* Pack. from the San Francisco Bay region has led me to check up on the synonymy as given in the new Check List. The type of *forficaria* Gn. is lost and the description does not fit the specimens before me very accurately; I cannot, however, make it agree with any other Californian species any better and prefer for the present to leave the name as it stands with *nubilata* Pack. as a synonym. Both sexes of this species are well-figured in Packard's Monograph, Pl. XIII, figs. 61, 62 and attention is called to the sharp apex of the forewing and the decided angle at vein 4. *Catenulata* Grt., based on a female from New Mexico with *anfractata* Hlst. from Arizona as a synonym, has been classified as a race of *forficaria*. It could very readily be considered a good species, judging by the two New Mexico males (Silver City, Taos) and a pair from the White Mts., Ariz., before me. The apex of the forewing in both sexes is less sharply produced and the angle at vein 4 much more gentle. The color is paler, the forewings being a light fawn, shading into fawn-brown beyond the t. p. line with none of the deep smoky shading (in the male at least) found in *forficaria;* the hindwings are much paler, especially terminally. , The male genitalia, while generally similar, show certain points of distinction; in *forficaria* a bulge on the median portion of the well-chitinized costa is broadly and evenly rounded; in *catenulata* this same bulge is more abrupt, more raised and rather irregular in outline. The strongly hollowed out juxta shows in *forficaria* a median, finger-like process, comparable to the furca-arm, which is lacking or reduced to a mere tubercle in *catenulata*, and the longitudinal bunch of cornuti in the vesica are stouter and longer in *catenulata*.

The form which occurs in southern British Columbia and which has been listed both by Blackmore and myself as *forficaria* combines characters found in both the other forms and would seem to be worthy of at least a racial name.

Prochaerodes forficaria v. combinata var. nov.

Closer in both wing shape and wing-color to *catenulata* than to *forficaria*. In both sexes the apex of the forewing is scarcely produced and the angle at vein 4 is very weak (in a few males slightly more pronounced than usual). The color in the male is a fawn-gray, slightly sprinkled with smoky atoms; the subterminal area is very variably shaded on both wings, some specimens show only a slight darkening of the ground-color, others a heavy smoky suffusion beyond the t. p. line and there are all manner of intergrades. The lines are distinct, especially the t. p. line with its pale edging, and the black dots in this line, emphasizing the veins, are generally more distinct than in either *forficaria* or *catenulata* especially on the underside. The fringes are also more distinctly checkered. In the male genitalia the species shows the finger-like median furca-arm of *forficaria*, but the costal projection and the cornuti of the vesica are much as in *catenulata*. The female shows the usual smoky shading in basal and subterminal areas, leaving a broad paler median band.

Holotype—♂, Seton Lake, B. C., June 2, 1926, (J. McDunnough); No. 4992 in the Canadian National Collection, Ottawa.

Allotype—♀, same data, June 3.

Paratypes—10 ♂, 2 ♀, same data, May 30, June 2, 3, 5, 6, 7, 13, 14, 15, 23; 1 ♂, Keremeos, B. C., June 22, 1925 (C. B. Garrett); 3 ♂, Fish Lake, Summerland, B. C., June 25-27, 1931, (A. N. Gartrell); 2 ♂, Shingle Cr. Road, Keremeos, B. C., June 30, 1936, (A. N. Gartrell).

RECORDS OF MALLOPHAGA FROM OKLAHOMA HOSTS

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The Mallophaga listed were collected from birds and mammals in various parts of Oklahoma as indicated. Included in the records of the material collected by the author during the past three years are numerous records from material furnished by various students in the Entomology Department of Oklahoma A. and M. College. Previous records of lice taken from hosts in this state are very few, although there are numerous papers on species of this group found on birds and mammals of the states north and east of Oklahoma.

I wish to acknowledge the host identifications made by Dr. F. M. Baumgartner, of this school, and the aid given by Professor E. W. Stafford, Mississsippi State College, with the identification of some of the Mallophaga.

The classification used is that of Harrison (1916); however some of the larger genera are rapidly being divided to form new genera in which the species are more closely allied and on the basis of the host-relationship. Therefore, the author feels quite sure some of the generic names used will soon be changed. All of the species listed are in my personal collection, except three species collected and sent by Mr. Harry Whitaker to the United States National Museum.

Family Gyropidae

Gliricola porcelli (Linn.) Guinea Pig; Stillwater.

Family Menoponidae

Menopon gallinae (Linn.) Domestic Chickens; Stillwater, Cromwell, Norman.

Menopon mesoleucum Nitz. Crow, *Corvus brachyrhynchos;* Stillwater.

Eomenacanthus stramineum (Nitz.) Domestic Chickens; Stillwater, Cromwell, Norman, Checotah.

Colpocephalum laticeps Kellogg Little Blue Heron, *Florida caerulea;* Cromwell: Great Blue Heron, *Ardea herodias;* Broken Bow, Alva: American Egret, *Casmerodius albus;* Stillwater.

Menacanthus chrysophaeus (Kellogg) Meadow Lark, *Sturnella magna;* Cromwell.

Menacanthus persignatus (Kellogg and Chapman) Meadow Lark, *Sturnella magna;* Cromwell.

Actornithophilus aegialitidis (Durrant) Killdeer, *Oxyechus vociferus;* Cromwell, Pawnee.

Ferrisia kelloggi (Osborn) Turkey Vulture, *Canthartes aura septentrionalis;* Checotah.

Trinoton anserium (Fabr.) Canada Goose, *Branta canadensis,* Stillwater.

Trinoton lituratum Nitz. Blue Winged Teal, *Querquedula discors;* Stillwater, Alva.

Trinoton querqudulae (Nitz.) Blue Winged Teal, *Querquedula discors;* Pawnee, Stillwater; Shoveller, *Spatula clypeata;* Alva, Stillwater: Mallard, *Anas platyrhynchos;* Stillwater: Green Winged Teal, *Nettion carolinense;* Pawnee.

Myrsidea americana (Kellogg) Crow, *Corvus brachyrhynchos;* Stillwater, Coyle, Cromwell.

Myrsidea dissimilis (Kellogg) Barn Swallow, *Hirundo erythrogaster;* Pawnee.

Myrsidea incerta (Kellogg) Orchard Oriole, *Icterus spurius;* Perkins.

Pseudomenopon tridens (Nitz.) Coot, *Fulica americana;* Alva.

Kurodaia subpachygaster (Piaget) Barn Owl, *Tyto alba pratincola;* Stillwater.

Heterodoxus longitarsus (Piaget) Domestic Dogs; Stillwater, Norman, Cromwell, Yale, Checotah.

Family Trichodectidae

Bovicola bovis (Linn.) Domestic Cattle; Stillwater, Cromwell.

Bovicola caprae (Gurlt.) Domestic Goats; Stillwater, Broken Bow.

Bovicola major (Piaget) Domestic Goats; Stillwater.

Bovicola ovis (Linn.) Domestic Sheep; Stillwater.

Bovicola equi (Linn.) Domestic Horses; Stillwater, Poteau.

Cervicola forficula (Piaget) Deer, *Odocoileus virginianus;* Cache.

Cervicola odocoilei (McGregor) Deer, *Odocoileus virginianus;* Cache.

Cervicola lipeuroides (Megnin) Deer, *Odocoileus virginianus;* Bartlesville.

Felicola subrostratus (Nitz.) Domestic Cat; Stillwater, Cromwell.

Geomydoecus scleritus (McGregor) Pocket Gopher, *Geomys breviceps;* Tecumseh, Stillwater.

Trichodectes octomaculatus (Paine) Raccoon, *Procyon lotor;* Wyandotte.

Trichodectes canis Degeer Domestic Dog; Stillwater.

Neotrichodectes mephitidis (Osborn) Skunk, *Mephitis mesomelas;* Stillwater, Cromwell; Civet Cat, *Spilogale interrupta;* Stillwater.

Family Philopteridae

Goniodes ortygis Denny Quail, *Colinus virginianus;* Checotah.

Goniodes meleagridis (Linn.) Domestic Turkey; Stillwater, Checotah.

Goniocotes bidentatus (Scopoli) Domestic Pigeon; Stillwater, Cromwell.

Goniocotes gigas Taschenburg Domestic Chickens; Okmulgee.

Goniocotes hologaster Nitz. Domestic Chickens; Stillwater.

Lipeurus pallipavonis (Geoff.) Domestic Turkey; Stillwater, Checotah.

Gallipeurus heterographus (Nitz.) Domestic Chickens; Stillwater.

Cuculaecus coccygus (Osborn) Yellow Billed Cuckoo, *Coccyzus americanus;* Perkins.

Anaticola crassicorne (Scopoli) Shoveller, *Spatula clypeata;* Alva, Stillwater; Blue Wing Teal, *Querquedula discors;* Stillwater: Green Wing Teal, *Nettion carolinense;* Pawnee: Mallard, *Anas platyrhynchos;* Stillwater.

Rallicola advena (Kellogg) Coot, *Fulica americana;* Alva.

Picicola straminea (Denny) Flicker, *Colaptes auritus;* Cromwell.

Eustrigiphilus ceblebrachys (Nitz.) Snowy Owl, *Nyctea nyctea;* Hugo.

Philopterus agelaii (Osborn) Red Wing Blackbird, *Agelaius phoenicus:* Cromwell.

Philopterus californiensis (Kellogg) Red Headed Woodpecker, *Melanerpes erythrocephalus;* Stillwater, Alva.

Philopterus communis Nitz. Kingbird, *Tyrannus verticalis;* Stillwater.

Philopterus corvi (Linn.) Crow, *Corvus brachyrhynchos;* Stillwater, Coyle, Checotah.

Philopterus cursor Nitz. Barn Owl, *Tyto alba pratincola;* Stillwater.

Philopterus cristata Malcomson Blue Jay, *Cyanocitta cristata;* Cromwell.

Philopterus subflavenscens (Geoff.) Cardinal, *Richmondena cardinalis:* Cromwell, Stillwater: Meadow Lark, *Sturnella magna;* Cromwell: Mocking Bird, *Mirmus polyglottos;* Cromwell: Loggerhead Shrike, *Lanius ludovicianus;* Alva, Stillwater, Cromwell: Chickadee, *Penthestes atricapillus;* Cromwell: Goldfinch, *Spinus tristis;* Cromwell.

Philopterus jungens Kellogg Flicker, *Colaptes auritus;* Cromwell.

Philopterus syrnii (Packard) Burrowing Owl, *Speotyto cunicularis hypogcea;* Pawnee.

Philopterus taurocephalus (Kellogg) Swainson's Hawk, *Buteo swainsoni;* Stillwater: Marsh Hawk, *Circus hudsonius;* Stillwater.

Anataecus dentatus (Scopoli) Blue Wing Teal, *Querquedula discors;* Pawnee, Stillwater.

Degeeriella boephilus Kellogg Yellow Legs, *Totanus flavipes;* Stillwater.

Degeeriella ductilis (Kellogg and Chapman) Grass sparrow, Sp. ?; Stillwater.

Degeeriella foeda (Kellogg and Chapman) Kingbird, *Tyrannus verticalis;* Stillwater: Scissor-tail, *Muscivora forficata;* Stillwater.

Degeeriella fusca Nitz. Swainson's Hawk, *Buteo swainsoni;* Stillwater: Marsh Hawk, *Circus hudsonius;* Stillwater: Sparrow Hawk, *Falco sparverius;* Cromwell: Sharp-shinned Hawk, *Accipiter velox;* Stillwater: Red-tailed Hawk, *Buteo borealis;* Stillwater.

Degeeriella interpositus (Kellogg) Mocking Bird, *Mimus polyglottos;* Cromwell.

Degreeriella rotundata (Osborn) Crow, *Corvus brachyrhynchos;* Stillwater.

Degeeriella illustris Kellogg Cowbird, *Molathrus ater;* Perkins.

Degeeriella vulgatus Kellogg Lark Sparrow, *Choudestes grammacus;* Stillwater: English Sparrow, *Passer domesticus;* Cromwell.

Columbicola columbae (Linn.) Domestic Pigeon; Stillwater: Mourning Dove, *Zenaidura macroura;* Cromwell, Pawnee.

Lagopoecus perlexus (Kellogg) Lesser Prairie Chicken, *Tympanuchus pallidicinctus;* Arnett.

Philichthyophaga toxocerum (Nitz.) Cormorant, *Phalacrocorax auritus;* Alva.

SUMMARY OF HOST RECORDS

Host	Parasite
Cormorant, *Phalacrocorax auritus*	*Philichthyophaga toxocerum* (Nitz.)
Great Blue Heron, *Areda herodias*	*Colpocephalum laticeps* Kellogg
American Egret, *Casmerodius albus*	*Colpocephalum laticeps* Kellogg
Little Blue Heron, *Florida caerulea*	*Colpocephalum laticeps* Kellogg
Canada Goose, *Brantà canadensis*	*Trinoton anserium* (Fabr.)
Mallard, *Anas platyrhynchos*	*Trinoton querqudulae* Nitz.
	Anaticola crassicorne (Scopoli)
Green Wing Teal, *Nettion carolinense*	*Trinoton querqudulae* Nitz.
	Anaticola crassicorne (Scopoli)
Blue Wing Teal, *Querquedula discors*	*Trinoton lituratum* Nitz.
	Trinoton querqudulae Nitz.
	Anaticola crassicorne (Scopoli)
	Anataecus dentatus (Scopoli)
Shoveller, *Spatula clypeata*	*Trinoton querqudulae* Nitz.
	Anaticola crassicorne (Scopoli)
Turkey vulture, *Cathartes a. septentrionalis*	*Ferrisia kelloggia* (Osborn)
Sharp-shinned Hawk, *Accipiter velox*	*Degeeriella fusca* Nitz.
Red-tailed Hawk, *Buteo borealis*	*Degeeriella fusca* Nitz.
Swainson's Hawk, *Buteo borealis*	*Philopterus taurocephalus* (Kellogg)
	Degeeriella fusca Nitz.
Marsh Hawk, *Circus hudsonius*	*Philopterus taurocephalus* (Kellogg)
	Degeeriella fusca Nitz.
Prairie Falcon, *Falco mexicanus*	*Degeeriella fusca* Nitz.
Sparrow Hawk, *Falco sparverius*	*Degeeriella fusca* Nitz.
Lesser Prairie Chicken, *Tympanuchus pallidicinctus*	*Lagopoecus perlexus* (Kellogg)
Quail, *Colinus virginianus*	*Goniodes ortygis* Denny

Chicken	*Menopon gallinae* (Linn.)
	Eomenacanthus stramineum (Nitz.)
	Goniocotes gigas Taschenburg
	Goniocotes hologaster Nitz.
	Gallipeurus heterographus (Nitz.)
Turkey	*Goniodes meleagridis* (Linn.)
	Lipeurus pallipavonis (Geoff.)
Coot, *Fulica americana*	*Pseudomenopon tridens* (Nitz.)
	Rallicola advena (Kellogg)
Killdeer, *Oxyechus vociferus*	*Actornithophilus aegialitidis* (Durrant)
Yellow Legs, *Totanus flavipes*	*Degeeriella boephilus* Kellogg
Dove, *Zenaidura macroura*	*Columbicola columbae* (Linn.)
Pigeon	*Goniocotes bidentatus* (Scopoli)
	Degeeriella hebes (Kellogg)
	Columbicola columbae (Linn.)
Yellow-billed Cuckoo, *Coccyzua americanus*	*Cuculaecus coccygus* (Osborn)
Barn Owl, *Tyto alba pratincola*	*Philopterus cursor* (Nitz.)
	Kurodaia subpachygaster (Piaget)
Snowy Owl, *Nyctea nyctea*	*Eustrigiphilus ceblebrachys* (Nitz.)
Burrowing Owl, *Speotyto cunicularis hypogcea*	*Philopterus syrnii* (Packard)
Flicker, *Colaptes auritus*	*Picicola straminea* (Denny)
	Philopterus jungens Kellogg
Red-headed Woodpecker, *Melanerpes erythrocephalus*	*Philopterus californiensis* (K.)
Kingbird, *Tyrannus verticalis*	*Philopterus cummunis* Nitz.
	Degeeriella foeda (Kellogg & Chapman)
Scissor-tail, *Muscivora forficata*	*Degeeriella foeda* (Kellogg & Chapman)
Barn Swallow, *Hirundo erythrogaster*	*Myrsidea dissimilis* (Kellogg)
Blue Jay, *Cyanocitta cristata*	*Philopterus cristata* Malcomson
Crow, *Corvus brachyrhynchos*	*Myrsidea americana* (Kellogg)
	Philopterus corvi (Linn.)
	Degeeriella rotundata (Osborn)
Chickadee, *Penthestes atricaphillus*	*Philopterus subflavenscens* (Geoff.)
Mocking Bird, *Mimus polyglottos*	*Philopterus subflavenscens* (Geoff.)
	Degeeriella interpositus (Kellogg)
Loggerhead Shrike, *Lanius ludovicianus*	*Philopterus subflavenscens* (Geoff.)
English Sparrow, *Passer domesticus*	*Degeeriella vulgatus* Kellogg
Meadow Lark, *Sturnella magna*	*Philopterus subflavenscens* (Geoff.)
	Menacanthus persignatus (K. and C.)
	Menacanthus chrysophaeus (Kellogg)
Red-winged Blackbird, *Agelaius phoeniceus*	*Philopterus agelaii* (Osborn)
Orchard Oriole, *Icterus spurius*	*Myrsidea incerta* (Kellogg)
Cowbird, *Molathrus ater*	*Degeeriella illustris* Kellogg
Cardinal, *Richmondena cardinalis*	*Philopterus subflavenscens* (Geoff.)
Goldfinch, *Spinus tristis*	*Philopterus subflavenscens* (Geoff.)
Lark Sparrow, *Choudestes grammacus*	*Degeeriella vulgatus* Kellogg
Grass Sparrow, Sp ?	*Degeeriella ductilis* (K. and C.)
Raccoon, *Procyon lotor*	*Trichodectes octomaculatus* (Paine)
Civet Cat, *Spilogale interrupta*	*Neotrichodectes mephitidis* (Osborn)
Skunk, *Mephitis mesomelas*	*Neotrichodectes mephitidis* (Osborn)
Dog	*Heterodoxus longitarsus* (Piaget)
	Trichodectes canis Degeer

Cat	*Felicola subrostratus* (Nitz.)
Pocket Gopher, *Geomys breviceps*	*Geomydoecus scleritus* (McGregor)
Guinea Pig	*Gliricola porcelli* (Linn..)
Sheep	*Bovicola ovis* (Linn.)
Goat	*Bovicola caprae* (Gurlt.)
	Bovicola major (Piaget)
Deer, *Odocoileus virginianus*	*Cervicola forficula* (Piaget)
	Cervicola odocoilei (McGregor)
	Cervicola lipeuroides (Megnin)
Cattle	*Bovicola bovis* (Linn.)
Horses	*Bovicola equi* (Linn.)

BOOK NOTICE

BIO-ECOLOGY. By F. E. Clement and V. E. Shelford. John Wiley & Sons, Inc., New York. Pages i–vi and 1–425; 85 figures. 1939. Price $4.50.

This book is to be commended as an ecological text due to the effort put forth by the authors to correlate the fields of plant and animal ecology as well as to render the terminology less technical and therefore less confusing to all but specialists in ecology. The plan of the volume was formulated by the senior author and adjusted to meet the requirements of existing knowledge in both fields. This adjustment, due to lack of detailed knowledge of animal relations, necessitated the omission of the consideration of the deciduous forest, the coniferous forest and the desert biotic communities. The title 'Bio-ecology' was mainly selected to give emphasis to the existing relations between plants and animals.

The first chapter on the nature and relations of bio-ecology contains a review of the outstanding figures and their contributions from 1877 to 1937 in the development of the biotic community concept. In Chapter Two, on community functions, the biome or plant-animal formation is dealt with from such angles as cause and effect, life forms, aggregation, migration, interrelationships, etc. Chapter Three on the influence of community on habitat considers such reactions as those of the air, on land, and in the water. Chapter Four, on the interrelations of organisms (coactions), discusses this phase of ecology from viewpoints such as their significance, consequence, and types. The next three chapters deal with aggregation (competitive and cyclic), migration, and the climax. In Chapter Eight the North American grassland is discussed at length as an illustration of the biome. The last two chapters on the aquatic climax and marine biotic communities illustrate the parallelism of aquatic and land communities. A short appendix on methods employed in ecological investigations, a bibliography of approximately 900 references, by author, year, title, and source, and an idex which is particularly convenient to the layman in referring to the 'terms' used, completes the volume.

R. H. Ozburn

Mailed Friday, May 31st, 1940.

Guelph Printing Service

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